BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : G21B 1/00 — A1

(11) International Publication Number: WO 90/15416

(43) International Publication Date: 13 December 1990 (13.12.90)

(21) International Application Number: PCT GB90/00864

(22) International Filing Date: 4 June 1990 (04.06.90)

(30) Priority data:
8912834.2 3 June 1989 (03.06.89) GB

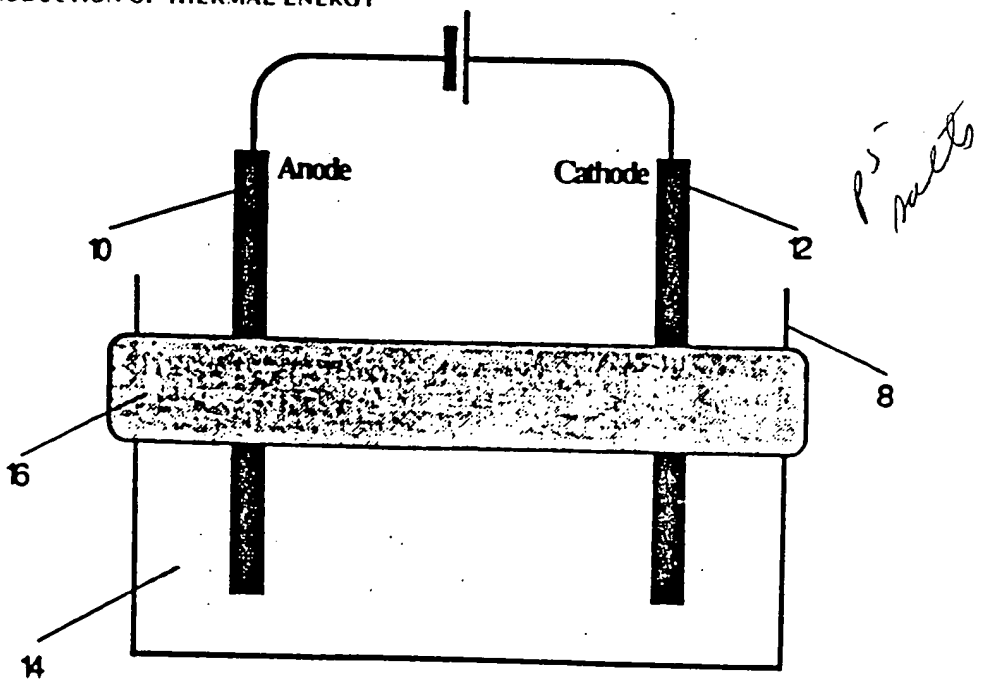
(71)(72) Applicant and Inventor: EDWARDS, Barrie, Cyril [GB GB]; "Homeside", 38 Blundell Road, Hightown, Merseyside L38 9EQ (GB).

(74) Agent: ROYSTONS; Tower Building, Water Street, Liverpool L3 1BA (GB).

(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE*, DE (European patent)*, DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US.

Published
With international search report.

(54) Title: PRODUCTION OF THERMAL ENERGY



(57) Abstract

The invention concerns means for producing thermal energy in an electrolyte cell (8) containing electrodes (10, 12) immersed in an electrolyte (14). The electrolyte (14) contains a higher isotope of a low atomic weight atom. Electric current is passed through the electrodes and magnetic influence (16) is applied to the electrolyte or one or each electrode.

* See back of page

Title: Production of thermal energy

DESCRIPTION

The present invention relates to the production of thermal energy.

It is believed that thermal energy can be produced by nuclear fusion at ambient temperatures. When an electric current is passed through palladium or titanium electrodes immersed in an electrolytic solution of various metal salts in deuterated or tritiated water ranging from 100% D_2O or T_2O or a mixture of the two compounds in any ratio down to the levels found in pure water containing natural levels of deuterium and tritium, a small but significant flux of neutrons is detected. Fusion of deuterons either at the surface or within the metal lattice of the electrode may be the explanation. The reaction is accompanied by thermal energy production which can in turn be used as a source of heat or converted into mechanical or electrical energy.

An object of the present invention is to control the rate of producing the thermal energy so that it can be harnessed in sufficient quantity to do useful work as thermal, electrical or mechanical energy.

According to the present invention there is

provided means for producing thermal energy comprising passing an electric current through electrodes immersed in a solid, liquid or gaseous electrolyte containing a higher isotope of a low atomic weight atom and applying a magnetic influence to the electrolyte or one or each electrode.

The preferred electrolyte contains deuterium as heavy water although other atoms such as tritium or lithium may be included. The cathode is preferably of palladium or titanium, although electrodes of other rare earth metals or iron, cobalt or nickel may also be suitable. The latter, in fact, being ferromagnetic already exert a magnetic influence on the electrolyte and at the surface of the electrode.

Magnetic influence on the electrolyte is used principally to distort electrically charged species forming during the electrolysis process at the anode or cathode to control the rate of fusion of charged atoms. Not only ferromagnetism or induced magnetism may be used but various forms of electromagnetic radiation may be used but various forms of electromagnetic radiation may be used to achieve that, including electric current waves, radio waves, microwaves, infra-red waves, visible and ultra violet light, and X-rays and gamma rays in a point source or laser or maser like fashion. The thermal energy produced is used as a heat source in its

own right or as the driving force in an energy conversion process such as a steam or heat engine or other conversion device using principles applied in thermionic or thermoelectric devices.

Thus the invention provides both a method and apparatus for the controlled production of thermal energy by nuclear fusion.

It is believed that the nuclear fusion concerned herein occurs by combination of say deuterium as D^+ either at the surface or in the lattice of the cathode to produce He with the accompanying release of nuclear binding energy. At the surface of the cathode during electrolysis the deuterium ion D^+ forms prior to the possible cathodic reaction.

$$^2D^+ + {}^2D^+ \rightarrow {}^3He^{2+} + n + \text{Energy}$$

$$^3He^{2+} + 2e^- \rightarrow {}^3He$$

D^+ in the presence of an induced or permanent magnetic field becomes a dipole which allows opposite ends of adjacent dipoles of the species D^+ to attract each other to the point where short range nuclear binding forces overcome the tendency of atoms to repel one another and fusion takes place to produce helium nuclei possibly giving off neutrons and with thermal energy production.

The invention will now be further described, by way of an example only with reference to the

accompanying drawings, in which:-

Figure 1 shows schematically a first electrolytic cell according to the invention; and

Figure 2 shows schematically a second electrolytic cell according to the invention.

Referring to Figure 1 of the accompanying drawings, in a cell 8 at ambient temperature and pressure (between 273 degrees & 373 degrees K, 1 atmosphere) electric current is passed through electrodes 10, 12 immersed in an electrolyte 14 comprising a polar solvent and containing heavy water (deuterium oxide) and metal salts, such as ferrous sulphate, nickel chloride, palladium chloride, calcium carbonate, lithium sulphate, lithium hydroxide, sodium hydroxide, sodium chloride, sodium sulphate, $CaH_4(PO_4)_2 .H_2O$, $TiOSO_4 H_2O.8H_2O$ and AuCN. The pH of the electrolyte is adjusted to about 3. Magnetic influence 16 is applied to the electrolyte particularly in the region of the cathode 12.

At the cathode deuterium nuclei fuse to produce helium nuclei with the production of thermal energy. The energy thus produced may be converted to useful work by any of the methods mentioned earlier, the preferred method being the heat engine (Sterling Engine).

Turning to Figure 2 of the accompanying drawings, a cell 108 comprises an anode chamber 110 and a cathode

chamber 112 connected by a passage 114. At ambient temperature and pressure (between 273 degrees & 373 degrees K, 1 atmosphere) electric current is passed through electrodes 100, 120 immersed in an electrolyte 140 comprising a polar solvent and containing heavy water (deuterium oxide) and metal salts, such as ferrous sulphate, nickel chloride, palladium chloride, calcium carbonate, lithium sulphate, lithium hydroxide, sodium hydroxide, sodium chloride, sodium sulphate, $CaH_4(PO_4)_2.H_2O$, $TiOSO_4H_2O.8H_2O$ and AuCN. The pH of the electrolyte is adjusted to about 3. Magnetic influence 160 is applied to the electrolyte in the cathode chamber 112.

As with the embodiment of Figure 1, at the cathode deuterium nuclei fuse to produce helium nuclei with the production of thermal energy. The energy thus produced may be converted to useful work by any of the methods mentioned earlier, the preferred method being the heat engine (Sterling Engine).

CLAIMS

1. A method for producing thermal energy comprising passing an electric current through electrodes immersed in a solid, liquid or gaseous electrolyte containing a higher isotope of a low atomic weight atom and applying a magnetic influence to the electrolyte or one or each electrode.

2. A method as claimed in claim 1, wherein the electrolyte contains deuterium as heavy water.

3. A method as claimed in claim 1 or 2, wherein the electrolyte contains tritium or lithium atoms.

4. A method as claimed in claim 1, 2 or 3, wherein the electrode is of a rare earth metal.

5. A method as claimed in claim 4, wherein the electrode is of palladium or titanium.

6. A method as claimed in claim 1, 2 or 3, wherein the electrode is of iron, cobalt or nickel.

7. A method as claimed in any one of claims 1 to 6, wherein magnetic influence applied is ferromagnetic.

8. A method as claimed in any one of claims 1 to 6, wherein magnetic influence applied is induced magnetism.

9. A method as claimed in any one of claims 1 to 6, wherein magnetic influence applied is electromagnetic.

10. A method as claimed in claim 9, wherein the electromagnetic influence is provided by electric

current waves, radio waves, microwaves, infra-red waves, visible or ultra violet light, X-rays or gamma rays.

11. A method as claimed in claim 9 or 10, wherein electromagnetic influence is applied in a point source, laser or maser like fashion.

12. Apparatus for carrying out the method as claimed in any one of claims 1 to 11, comprising a cell containing solid liquid or gaseous electrolyte containing a higher isotope of a low atomic weight atom, electrodes, means for passing electric current through the electrodes and means for applying magnetic influence to electrolyte or one or each electrode.

13. A method for producing thermal energy as claimed in claim 1 and substantially as hereinbefore described with reference to the accompanying drawing.

14. Apparatus for producing thermal energy substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

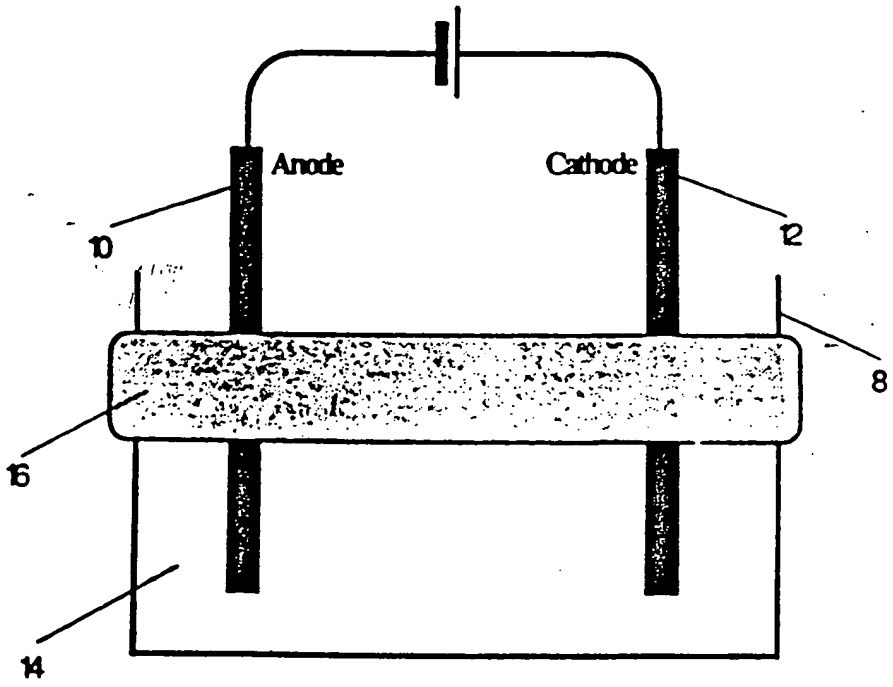


Fig 1

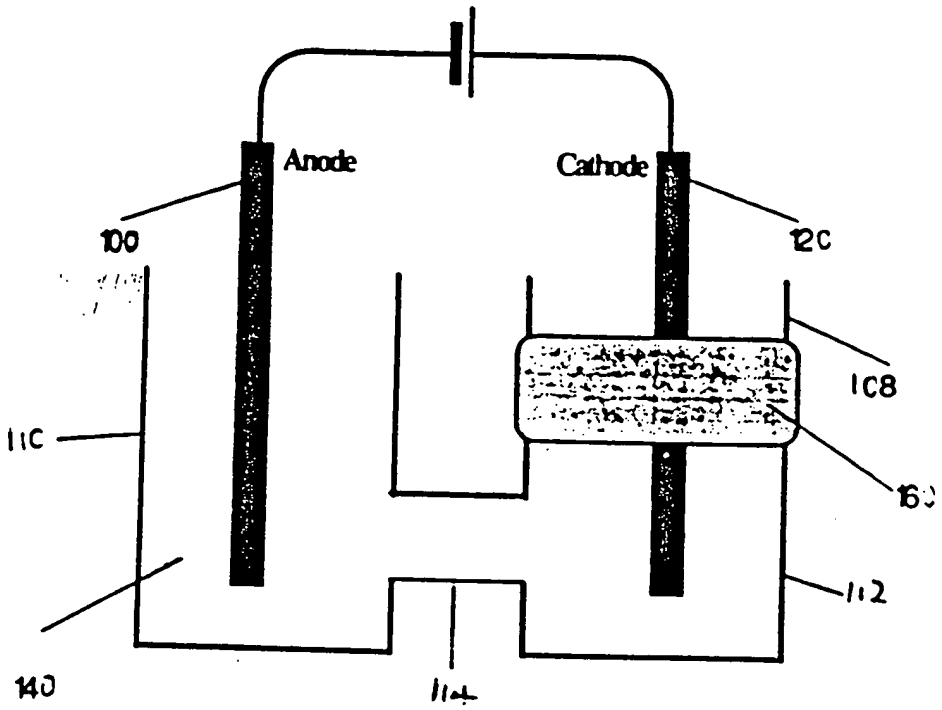


Fig 2

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 90/00864

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC^5: G 21 B 1/00

II. FIELDS SEARCHED

Minimum Documentation Searched *

Classification System	Classification Symbols
IPC^5	G 21 B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched *

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages **	Relevant to Claim No **
P,A	Fusion Technology, vol. 16, no. 2, September 1989, (La Grange Park, IL, US), A.G. Gu et al.: "Preliminary experimental study on cold fusion using deuterium gas and deuterium plasma in the presence of palladium", pages 248-250 see the whole article --	1,12
P,A	Zeitschrift für Physik A, Atomic Nuclei, vol. 333, no. 3, July 1989, Springer International, (Berlin, DE), D. Alber et al.: "Search for neutrons from 'cold nuclear fusion'", pages 319-320 see the whole article ----------	1,12

* Special categories of cited documents: **

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
31st August 1990	28.09.90
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	F.W. HECK

Form PCT/ISA/210 (second sheet) (January 1985)